

MARVIN (J. B.)

A HISTORY

OF THE

DIAGNOSIS, PATHOLOGY AND TREATMENT

OF

YELLOW FEVER.

BY

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YELLOW FEVER.

When yellow fever first began its ravages in the south, Louisville declared against quarantines, opened wide her doors, and bade the fleeing refugees from the plague-smitten districts to come and freely partake of her hospitality. It soon became evident that among the many refugees who came to our city that cases of yellow fever would occur; and the mayor and board of health speedily set about preparing a suitable hospital for the reception and treatment of such cases.

The hospital.—One of the buildings of St. John's Hospital, beautifully situated on a hill three miles south of the city, and but a short distance from the junction of the Cincinnati and Nashville railroads, was selected. Two pavilion hospitals, containing respectively eight and ten rooms, were also erected and thoroughly equipped, a corps of experienced nurses engaged, and the writer appointed resident physician. These buildings were admirably adapted for the required purposes. The rooms were large and well ventilated; the partitions did not extend to the roof; all the rooms communicated with each other, and opened on a wide hall-way.

Number of patients.—The first patient was admitted on August 5th; the last on October 17th. Total number admitted, eighty-nine; of which number seventy had genuine yellow fever—sixty-six being among southern refugees, and four originating in Louisville, among the inhabitants of the so-called "infected district," near the Louisville and Nashville railroad depot; fourteen had intermittent fever, and five were

not sick, children whose parents were sick in the hospital. The recoveries number fifty-eight; deaths thirty-one, from yellow fever. When we take into consideration the fact that all of these patients were moved to the hospital after the disease had become well marked,—some developing the disease while *en route* to this city, others being moved from Paris, Tenn., a distance of two hundred and fifty miles, and other southern towns, after being sick for several days,—the above mortality is not large.

Symptoms.—None of the cases were seen in the incubating stage of the disease. Most of the cases were in the second stage, some in the third stage; black vomit, etc., having occurred. The symptoms on admission were generally a hot, dry and harsh skin; in some cases that had been moved a long distance the skin was cold, clammy and bathed in profuse perspiration. Eyes bright and glistening; conjunctiva badly injected; the sclerotic tinged yellow, except in cases of several days' standing, when the eyes were heavy and lusterless, face flushed, great pain in small of the back, legs and head; tongue red and coated; bowels costive; great irregularity in pulse and temperature—the pulse running from thirty-five to one hundred and forty beats per minute, temperature ranging from ninety-seven to one hundred and six degrees. There is no correspondence between the pulse and temperature; frequently a high temperature being associated with a slow pulse, and *vice versa*. The respirations are quick and shallow. The perspiration is generally strongly acid in reaction, and possesses a most peculiar odor, difficult to describe, but once recognized never forgotten—a dysenteric, rotten-hay or slacking-lime smell, not cadaveric as generally described by writers.

When the disease is well established, the fauces are swollen and of an intense red color; the tongue is enlarged, very red, the papillæ being very prominent, the edges are indented. At first there is a thick white or creamy coating on the surface; frequently the tip, edges and narrow space on each side of the median line are clean and not coated. As the disease

progresses the coating gradually disappears; and in severe cases the papillæ become obliterated, its surface becomes smooth and cracked, very red and dry, resembling a piece of raw beef. The tongue bears no resemblance to the pale, flabby and enlarged tongue of malarial fever.

The skin is generally moist, and becomes tinged yellow in varying intensity. In some cases there is a herpetic eruption on the body and around the mouth and nose; severe urticaria occasionally occurs. Sudamina are frequent. A considerable proportion of convalescents suffer with furuncles and shedding of the epidermis.

The bowels become loose, the stools being very offensive, and generally black and tarry in appearance. Occasionally the stools resemble pea-soup, or they may be composed of shreddy mucus mixed with blood or bile, or be composed of blood and resemble black vomit.

The urine is high-colored, varying from amber to a greenish coffee color. This high color is due to an admixture of blood or bile, or frequently simply to a large excess of the normal pigment. The odor may be normal, faint and sweetish; in some cases it is very disagreeable, something like carburetted hydrogen or decayed leaves. The quantity is generally diminished; the reaction is acid, very seldom neutral, and never more than feebly alkaline, no matter how much blood or bile there may be in it. The specific gravity varies from 1.004 to 1.030; the average being 1.020. It is high in the beginning of the attack; diminishes as the disease progresses; rising again as convalescence ensues. A lowering in the specific gravity, with an increased quantity of urine, is a favorable symptom. Sugar is never present, unless the patient has had previous diabetes mellitus. Bile, in varying amount, is present sooner or later in the *great* majority of cases. Albumen is present in *every* case,—the amount varying from a trace to nine-tenths the total amount of urine passed. The greater the amount of albumen, the graver the prognosis. In severe cases, albumen always appeared as soon as the *second* day; in mild cases, it may not appear until the fourth or fifth day.

Albumen generally disappears from the urine as convalescence sets in; but it may persist until the patient is up and able to walk about.

Associated with albumen are granular tube-casts, stained greenish brown or yellow with bile, renal epithelium, more or less disintegrated, and large quantities of fine granular *débris*. The amount of this granular *débris* is much greater than I have ever seen in cases of acute Bright's disease from other causes. Renal derivations generally appear on the second day in severe cases; in mild cases, they may not be found until the fourth or fifth day. Vesical epithelium, in varying amount, is generally present in the urine. In some few cases there was a marked shedding of vesical epithelium preceding the appearance of renal derivations. No symptoms are of more value in the prognosis of a case than the amount of albumen and renal derivations. The smaller the quantity of albumen and tube-casts, the milder the attack, and *vice versa*. Renal derivations usually disappear as convalescence sets in, but they may persist in severe cases until the patient is able to be out of bed. In a small proportion of cases there were vesical and renal hemorrhages in considerable quantities. Urea varies from normal to less than one-half the normal amount; most generally it falls below normal. The urine speedily undergoes decomposition; in fact decomposition may take place in the bladder. Large quantities of vibrios and bacteria may be present when the urine is voided.

The breath.—Pure glycerin was smeared in the center of a clean, new glass slide, and held an inch or two from the nostrils or mouth of the patient. After a few minutes' exposure to the breath, the slide was examined under the microscope. Large quantities of very active vibrios were revealed, also roundish oval bodies, bacteria.

The blood.—A drop of blood from the finger was received on a slide, covered, avoiding pressure, and examined. The corpuscles were jagged and crenated; frequently the red globules were breaking up, forming as it were daughter-cells. In severe cases, especially after black vomit had occurred, there

was a very large increase in the number of white corpuscles, the proportion frequently being as one white to five or ten red corpuscles. Scattered among the corpuscles were found vibrios and bacteria, frequently five or six very active bacteria being in the field. More extended observations, in this and other fevers, must be made before attaching undue importance to the existence of these bodies in the blood and breath. Every possible precaution was taken, in making these examinations, to avoid contaminations. The examinations were made with a Tolles $\frac{1}{10}$ inch immersion objective and a "B" ocular.

The stomach.—Irritable stomach and nausea, in varying intensity, are present in all cases. After the stomach had been emptied of food, the first ejections consist of glairy mucus and epithelium, streaked with blood, bearing a striking resemblance to the rusty sputum of pneumonia. Biliary matter was very frequently ejected, sometimes in considerable quantity. Pure blood was frequently ejected in large quantities; later in the disease, vomiting of blood frequently alternating with and following black vomit. The vomit is acid, patients frequently complaining of its burning the throat and mouth.

Black vomit occurred in about fifty per cent. of the cases, the amount varying from a few spoonfuls to more than a pint at each ejection. This symptom has not proved as unfavorable as is generally believed. Ten cases have recovered after having had black vomit. One case, a mulatto, having vomited a large quantity of it on three different occasions, with intervals of one and two days, yet recovered. The coffee-ground or black vomit consists of blood, more or less broken down and digested by the gastric juices and bile, epithelium and fat globules. There were also found large quantities of vibrios, an oval (not recognized) fungus, and frequently very large crystals of hematoidin.

Hiccough and retching are constant symptoms, and may prove very distressing. In some severe cases there are spasmodic contractions of the diaphragm, causing most violent and painful retching; the contraction is so violent in some

cases as to partially raise the patient from the pillow. Generally the epigastrium is not markedly sensitive on pressure. In those cases having a temperature ranging over one hundred degrees, great restlessness and nervousness are present; in those cases in which the temperature ranges from ninety-seven to one hundred degrees, the patient lies in a stupid, lethargic condition. A hemorrhagic tendency is present in all cases. In all severe cases, hemorrhage varying in amount occurs from some portion of the body—the eyes, nose, ears, mouth, rectum, uterus, bladder, kidneys, etc.; most frequently from the mouth and nose. The hemorrhage is passive, generally an oozing, and is easily controlled; in some cases, however, it comes in a stream from the nose. These passive hemorrhages are caused either by an alteration in the blood itself, or some change in the epithelium lining the vessels and mucous membranes, or by both.

The unfavorable symptoms are a fiery red, dry and cracked tongue; irritable stomach, with constant nausea and vomiting; great pain over the bowels; suppression of urine; passage of feces in bed; rejection of food and medicine by the stomach and bowel; great delirium, getting out of bed, etc.

Before death muscular twitchings frequently occur, the extremities get cold and clammy, and large drops of sweat appear on the face and neck. The temperature may fall to 97 degrees; immediately after death the temperature begins to rise, and may go as high as $106\frac{1}{4}$ degrees under the axilla, the body remaining warm for twelve hours or more. Spare-built persons, with light hair and complexion, resist the disease better than stout, plethoric persons, with dark hair and complexion. The average duration of the disease in fatal cases is four days.

Diagnosis.—The diagnosis of yellow fever is not as easily made as one would be led to believe from the literature of the subject. It presents a striking resemblance, in many respects, to pernicious intermittent and bilious remittent fevers. The chief diagnostic points are the peculiar smell, tongue, great irregularity of pulse and temperature, and the constant existence of albumen and renal derivatives in the urine.

Pathological anatomy.—Cadaveric rigidity occurs very early, and is very marked. The skin is of a bright yellow or saffron color, quickly changing to a purplish black over the dependent portions of the body. In severe cases the entire surface of the body becomes purplish black within six hours. The mucous membranes are tinged yellow, and the cellular tissues are stained of a bright yellow color.

The peritoneum and mesentery may be normal; in a considerable proportion of cases they are more or less congested.

The stomach, as a rule, does not appear congested, as stated by writers upon this disease. The organ may be greatly distended with gas, filled with black vomit, or almost empty; more or less black vomit is always present. There is no marked injections of the veins—no ecchymotic spots; the mucous membrane is pale, there being no hemorrhagic erosions or ulcerations, no evidences whatever of acute catarrh. In only one case was there found thickening of the mucous membrane and enlargement of the rugæ. On examining a thin section under the microscope the glands are normal, the villi are not changed; the free extremities of the villi contain blood, which has oozed from the capillaries and is piled up under the epithelium. The microscopic examination clearly proves that the hemorrhage in this organ is passive, and not dependent on active congestion. The clinical history of the vomit confirms the microscopic examination. The changes stated to have been found in the stomach are post mortem changes.

The intestines generally show no marked changes; they always contain more or less black vomit. In some cases there are patches which are badly congested. In one case intussusception was found in three different places. A section of the gut, when examined under the microscope, may appear normal; in other cases, the villi and glands are in a state of acute catarrh.

The spleen presents no marked deviation from health; generally normal in size and consistency, and frequently darker in color. In cases giving a history of previous malarial trouble,

the organ was considerably enlarged. On microscopic examination, the organ appears normal, except in those cases having had malarial fever, when the pigmentation peculiar to malarial fevers was found.

The liver varies in color, being bright yellow, orange, nutmeg or mottled, or normal. The organ is generally enlarged, the enlargement being very slight in some cases. It is very firm, tough and elastic. On section, the hepatic cells are found in a granular condition, frequently stained with bile; nucleus pale and frequently obscured by oil globules. Within and around the cells are large quantities of oil globules, there being a fatty infiltration as well as fatty degeneration. There is frequently an increase in the connective tissue, with a consequent pressure upon and destruction of the neighboring cells. In one case, aged twenty-seven years, not a drinker, who had suffered at intervals for two years with malarial fever, there was an enormous increase in the connective tissue, visible to the eye, giving the organ the appearance found in cirrhosis. On section, all the appearances of cirrhosis were found; in parts there were fatty degeneration and infiltration, and a large amount of a delicate fibrous growth, resembling areolar tissue, minus the fat.

The kidneys are congested, and in some cases considerably enlarged; the capsules do not readily peel off; the malpighian tufts are prominent. On section, tubal and intertubal hemorrhages are frequently found. The tubes are choked up with fine granular *débris* and epithelium; in some parts the tubes are empty and denuded of epithelium. Fatty degeneration, slight in degree, is frequently found.

The bladder may present no changes; it may be full or empty and slightly contracted. In those cases having suppression of urine for any length of time before death, it is badly congested, the mucous membrane showing large ecchymotic spots. The gall bladder always contains thick yellow or blackish bile; in some cases it is enormously distended, the mucous membrane being congested.

The lungs and pleura presented no constant changes. In

several cases there were recent pleuritic adhesions; in one case there was severe pneumonia. In some cases the lungs are completely collapsed. The color is generally dark and mottled; ecchymotic spots are frequent.

The heart may be full or empty. In some cases there is marked fatty degeneration, the walls being pale and friable. Frequently the organ is normal. The pericardium always contains more or less reddish fluid, the amount varying from one to six ounces. No lesions were found in the cerebrum, nor constant changes at the base of the brain. In some cases which had had marked delirium, congestion and softening were found at the base. The spinal cord was not examined.

Treatment.—On admission the patient is given a hot mustard foot-bath while under the cover; he is covered with one or two blankets, sufficient to keep up the perspiration; profuse and indiscriminate sweating, by means of blankets or otherwise, is injurious. If the bowels are at all costive, half an ounce of castor-oil, with fifteen drops of turpentine, are given. If the patient objects to oil, or there is much nausea, with foul tongue, one grain of calomel and three or four of bicarbonate sodium are given every hour until four doses have been taken. If there is much nausea or retching, a pint of tepid water, containing a dessert-spoonful of mustard and salt, is given to empty the stomach. In all cases five grain doses of quinia were given every two or three hours until cinchonism was produced, a sufficient quantity being given daily to keep up a moderate cinchonism. If the stomach was irritable, the quinia was given in thirty grain doses by enema every six hours. In a few cases, after cinchonism had been induced, ten grain doses of salicylate of sodium, every six hours, were substituted for quinia, apparently with good effect.

Whenever the skin became very hot and dry, the patient was sponged off with cold water, to which a few ounces of alcohol had been added, the sponging being repeated as often as necessary. Cracked ice and ice-water, in small quantities at a time, were allowed *ad libitum*. If the tongue became very dry, red and cracked, dessert-spoonful doses of turpen-

tine emulsion—containing twenty per cent. of turpentine—were given every three or four hours. If this was rejected, fifteen drop doses of dilute muriatic acid, every three or four hours, were substituted. A pinch of salt placed on the tongue would frequently relieve hiccough; in severe cases, tincture of valerianate of ammonia was better. Lime water, subnitrate of bismuth, creasote or chloroform, in small doses, was useful in quieting the stomach and relieving nausea. When there were present nausea and frequent vomiting, with desire to go to stool, with pain in bowels and great tenesmus, the following prescription was most valuable:

R Bismuth, subnitrate, 3 ij
 Creasote, gtts. viij
 Lime water, ℥ ij. M.

Sig. Dessert-spoonful *pro re nata*.

If there was much tenderness over the bowels, a blister, six by six inches, was applied; in mild cases, a mustard-plaster or turpentine stupe was substituted. In stout, plethoric persons six or eight leeches were applied over the bowels; the leeches generally die from the bad blood. If there is any difficulty in passing urine, or diminution in its quantity, half an ounce of the infusion of digitalis with ten grains of acetate of potash, is given every two or three hours. This proved a most valuable remedy, only failing in two cases. In addition, a mustard-plaster, cupping, or alternate applications of warm and cold water over the bowels, were useful. Hypodermic injections of one-eighth of a grain of muriate of pilocarpine were tried in several cases, but without apparent benefit.

For nervousness and sleeplessness, chloral hydrate is the *best* remedy; give thirty grains each of chloral hydrate and bromide of potash, in one or two ounces of warm milk, by enema. This combination has a most happy sedative effect; it also lowers the temperature. In some cases, tincture of hyoscyamus has a happy effect.

Patients are very sensitive to the effects of opium and its salts; *very small* doses, either by the mouth or rectum, pro-

ducing alarming narcosis. Opium did not appear to interfere with the proper functions of the kidneys; its use was discontinued solely on account of its effect on the brain. A number of patients were given morphia while *en route* to this city; they never came from under the influence of the drug, but lay in a stupid, lethargic condition, pupils contracted, and died with all the appearances of narcotic poisoning. In some patients, who were constant eaters of morphia, most distressing appeals were made for it. Various devices were resorted to in order to deceive them; about a fourth of a grain of quinia in powder was given, and followed by thirty grains of chloral hydrate. If this failed, a hypodermic injection of eight or ten minims of *water* had the desired effect, quieting the cries of the patient and putting him to sleep.

If hemorrhage from the nose or mouth became free, a spray of Monsel's solution (half strength), always checked it. For hemorrhages from the stomach and bowels, if deemed advisable to check them, ten minims of Monsel's solution were given every hour. For renal hemorrhage, ten grains of gallic acid were given every three hours. In some cases fifteen minim doses of aromatic sulphuric acid were substituted.

Stimulants are required in every case. Port wine proved most acceptable and beneficial, it being retained when the stomach rejected everything else. Acid wines and *champagnes* disagreed in *every* case; complaints of their bad effects were so general, that they were discontinued. Brandy and whisky were given in all cases, either by mouth or rectum. During convalescence, ale and beer were much relished and were freely given. During the first two or three days of the attack, the less food taken the better. Milk, chicken-broth, beef essence, etc., according to the desire of the patient, were given in small quantities every hour. During convalescence, oyster soup, soft boiled eggs, crackers, toast, etc., in moderate quantity, are given. Great care is required to prevent the patient from over-eating. Not a single relapse occurred in this hospital, which is largely attributable to the great caution exercised in regulating the dietary of the patient.

General remarks.—Yellow fever is a continued fever, marked by slight remissions. Of the severe form of the disease there are two distinct types—one characterized by a hot, dry skin, and a temperature ranging from one hundred degrees to one hundred and six degrees; in the other variety the temperature may rise to one hundred and two degrees for the first day or two; it then falls and never rises above one hundred degrees, generally ranging from ninety-seven to one hundred degrees; the skin is cold and clammy, and is more markedly yellow than in the first variety; the pupils are contracted; this latter variety is the more fatal.

The disease is clearly dependent upon a specific blood poison, as yet not demonstrated by the microscope, unless we regard the changes found in the blood as detailed above, as the *cause* rather than a *result* of the disease. By adopting the theory of specific blood poisoning, the symptomatology of the disease is readily understood. Every carefully observed and recorded fact bearing on the contagiousness or infectiousness of the disease is of great importance. As bearing on this subject, I wish to record the following experience:

I remained at the hospital for a month as resident physician; eat and slept on the ground-floor in the building with patients, made daily examinations of the various excretions and secretions of the patients, and held frequent post mortem examinations. I never had the slightest symptom of the disease. There were twenty-eight employés on the premises as nurses, cooks, washer-men, etc., in constant contact with the patients. Physicians and clergymen from the city paid daily visits to the hospital. The ladies of the Flower Mission paid frequent visits, going through the wards distributing flowers, etc. These parties, returning to the city, came in contact with numerous persons; yet not a single individual who remained at the hospital, or who visited it or came in contact with parties visiting it, ever had yellow fever or any disease resembling it. The clothing and baggage of the patients were not burned or disinfected, but were stored in the building in which the nurses and myself slept and eat.

Only such hygienic regulations were adopted as would be enforced in any well-regulated hospital. The rooms were well ventilated and kept scrupulously clean. The bedding and bed-clothes were kept clean, and whenever soiled were aired and washed. The mattresses were never burned. Vomit, dejecta, etc., were not allowed to remain in the rooms, were emptied in pits about a hundred yards from the wards. The vessels, bed-pans, etc., were kept clean; if they smelt at all, they were aired or sprinkled with carbolic acid. Dead bodies were not allowed to remain in the wards, but were carried to the dead-house.

Whenever the nurses or myself felt "out of sorts," quinia was freely given. I had been troubled greatly with malaria before going to the hospital, and was taking quinia daily; at the hospital I suffered less from malaria than when in the city.

LOUISVILLE, KY.

